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EXAMINER	
NGUYEN, PHILLIP	
ART UNIT	PAPER NUMBER
2828	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/771,047	SPARIOSU ET AL.	
	Examiner	Art Unit	
	PHILLIP NGUYEN	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5-8,10,11,13,17,20-24,26-29,31-40,43-53,55,56 and 64-73* is/are pending in the application.

4a) Of the above claim(s) *10,11,13 and 56* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5-8,17,20-24,26-29,31-40,43-53,55 and 64-73* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant is advised to disregard the recent telephone conversation made by Examiner suggesting cancelling non-elected claim 13 and claim 22 in order to place the application for allowance. Examiner hereby withdraws all of allowed and objected claims which were indicated in the previous Office Action after further considideration. Because those claims were not rejected in the previous Office Actions, the final Office action is hereby withdrawn and replaced by a new non final Office Action.

Applicant's arguments with respect to claims 1, 5-8, 16-17, 20-24, 26-29, 31-40, 43-53, 55, 64-73 have been considered but are moot in view of the new ground(s) of rejection.

Claims 1, 5-8, 10-11, 13, 16-17, 20-24, 26-29, 31-40, 43-53, 54-56 and 64-73 are pending.

Claims 10-11, 13 and 56 are withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 52 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 52 and 53 recites the limitation "said plural pump sources" in lines 4 and 2-3, respectively. There is insufficient antecedent basis for this limitation in the claims.

Double Patenting

3. Claim 22 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 1. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1 and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent … Applied

Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of view of Feillens et al. (US 20040246570) and further in view of Kliner et al. (US 6882786).

With respect to claim 1, Corcoran discloses in Fig. 1 a laser system comprising:

a plurality of laser fibers (single mode fibers) ;

a high power pump source #1, #2, …#5 coupled to each of said laser fibers; and

an external cavity (External cavity) having an optical axis, and beam-flattening optics (collimating lens) said external cavity having a first lens (left lens), a single aperture (spatial filter), a second lens (right lens), and a mirror (semitransparent mirror) located at focal points of the first and second lenses.

However, Corcoran does not the laser fibers including double-clad Er:YAG laser resonators.

Feillens discloses in Fig. 9 laser fibers including Er:YAG laser resonators 940 and 950 except for explicitly teaching the fibers being double cladding types. According to Feillens, erbium doped YAG fiber are advantageously used to provide a method of amplifying input optical signals over a broader bandwidth which extends to approximately 1650 nm in contrast to the approximately 1620 nm upper limit of previously known amplifiers.

Kliner discloses a rare earth doped fibers and the advantage of a double clad fiber which is that much larger pump power can be coupled into the fiber using multimode pump sources by launching the pump light into the cladding rather than into the core. The pump light is still absorbed in the core and the signal light still propagates in the core (col. 9, lines 35-40).

It would have been obvious to one skill in the art at the time the invention was made to provide double cladding Er:YAG laser resonators as taught by Feillens and Kliner.

With respect to claim 5, Fig. 1 of Corcoran clearly shows each of said high power laser pump sources include a laser diode (AR coated laser diodes).

With respect to claims 6-7, Corcoran discloses the pump sources #1, #2, …#5 are either side coupled/edge coupled and/or via reflective cavity.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent … Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Feillens et al. (US 20040246570) and further in view of Kliner et al. (US 6882786) and further in view Waarts et al. (US 6298187). Corcoran, Feillens, and Kliner disclose the claimed invention except for the laser fibers with differing lengths differ in length from one another by more than 1.5 centimeters. Waarts discloses fibers with different lengths by at least 1.5 cm to form different wavelengths (col. 11, lines 27-38). It would have been obvious to one skill in the art at the time the invention was made to provide fibers with different lengths by at least 1.5 cm as taught by Waarts to provide different wavelengths.

6. Claims 16-17, 20-24, 26-28, are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent … Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Feillens et al. (US 20040246570) and further in view of Craig et al. (US 6356574).

With respect to claims 16-17, Corcoran, Feillens, and Kliner disclose the claimed invention except for a Bragg reflectors integrated in the laser fiber. Craig discloses in Fig. 1 Bragg reflectors 18A/18B integrated in the laser fiber 18. It would have been obvious to one skill in the art at the time the invention was made to provide the Bragg reflectors 14 as taught by Craig in order to provide an optical feedback stabilize wavelength (col. 16, lines 17-23).

With respect to claim 20, although the references do not teach the beam flattening optics being characterized by hexagonal geometry, it is well known in the art to use hexagonal geometry of optics to save space and reduce the lost of laser intensity.

With respect to claim 21, Corcoran discloses the plural sources including diodes.

With respect to claim 22, Feillens discloses the laser fibers are Er:YAG.

With respect to claims 23-24, Craig discloses a plurality of fibers 18 including integrated DBR 18A/18B in order to provide optical feedback and wavelength stabilization (col. 16, lines 17-23) with each pump source 15 including at least one diode and a diode emitter array for each of said plurality of laser fibers in order to achieve high pump power output from amplifiers 18 (col. 7, lines 59-67).

With respect to claims 26-27, Craig discloses in Fig. 4 clad end pumping configuration including discrete imaging optics for imaging output beams from each diode emitter array to each laser fiber.

With respect to claim 28, Craig and Corcoran disclose the claimed invention except for explicitly teaching the diode emitter array is adapted to transmit at wavelength of approximately 1.5 microns. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide claimed wavelength, since it has been held that discovering an

optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

7. Claims 29, 31-33, 36-38, 46-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent … Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Jiang et al. (US 6982997).

With respect to claim 29, Corcoran discloses in Fig. 1 a beam phase-locking system comprising:

a first means for receiving plural single-mode beams of electromagnetic energy and providing flat-top beams as output in response thereto (the fibers and collimating lenses); and

second means for combining said flat-top beams via spatial filtering (spatial filter and lenses) and providing a collimated combined beam in response thereto; and said spatial filter including beam flattening optics (collimating lenses) and first and second collimating lenses and a single aperture of predetermined diameter therebetween, and a mirror (semitransparent mirror), the aperture being located at the focal points of the first and second collimating lenses.

However, Corcoran does not explicitly teach Bragg reflectors integrated in the laser fibers.

Jiang discloses in Fig. 1 Bragg reflectors 14 integrated in the laser fiber 18. It would have been obvious to one skill in the art at the time the invention was made to provide the Bragg reflectors 14 as taught by Jiang in order to provide a feedback necessary to sustain the laser operation in the external cavity (col. 3, ln. 27-31).

With respect to claim 31, see the rejection of claims 16-17.

With respect to claim 32, the cladding is normally made by dielectric surrounding the cores of the fibers. It would have been obvious to one skill in the art at the time the invention was made to provide a dielectric cladding for the fiber.

With respect to claim 33, since Corcoran does not mention if the fibers having different length, it is believed that the lengths of the fibers are approximately equivalent.

With respect to claim 36, Corcoran and Jiang disclose the claimed invention except for explicitly teaching the diode emitter array is adapted to transmit at wavelength of approximately 1.5 microns. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide claimed Er molecular concentration, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

With respect to claims 37-38, Corcoran discloses means for pumping said fiber laser oscillator (laser diodes).

With respect to claims 39-40, the claims recite means for pumping including one or more pigtail couplers or discrete imaging optics. It is well known to use either pigtail or lens to couple pump sources to fibers in order to reduce loss due to the divergence of laser beams from pump sources.

With respect to claim 43, Corcoran discloses in the Fig. 1 that the mirror is semitransparent which is considered partially transmissive and being positioned adjacent to the second collimating lens.

With respect to claim 44, Corcoran further discloses the first means includes beam flattening optics positioned between the first collimating lens and the pump sources. It would have obvious to include the beam flattening optics located between the grating and the first collimating lens since the grating should be integrated in the fiber.

8. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent … Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Jiang et al. (US 6982997) in view of Hough (US 20040042085). Corcoran and Jiang disclose the claimed invention except for the beam flattening optics being characterized by hexagonal geometry. Hough on the other hand discloses hexagonal lenslets in order to reduce or avoid 10% loss of light intensity (paragraph 0029). It would have been obvious at the time the invention was made to provide the beam flattening optics characterized by hexagonal geometry as taught by Hough to Corcoran and Jiang.

9. Claims 34-35 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent … Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Jiang et al. (US 6982997) further in view Waarts et al. (US 6298187). Corcoran and Jiang disclose the claimed invention except for the laser fibers with differing lengths differ in length from one another by more than 1.5 centimeters. Waarts discloses fibers with different lengths by at least 1.5 cm to form different wavelengths (col. 11, lines 27-38). It would have been obvious to one

skill in the art at the time the invention was made to provide fibers with different lengths by at least 1.5 cm as taught by Waarts to provide different wavelengths.

10. Claims 49-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent … Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Jiang et al. (US 6982997) further in view Waarts et al. (US 6298187) and further in view of Hough (US 20040042085).

With respect to claim 49, Corcoran, Jiang and Waarts disclose the claimed invention except for the beam-combining optics being characterized by hexagonal geometry. Hough on the other hand discloses hexagonal lenslets in order to reduce or avoid 10% loss of light intensity (paragraph 0029).

It would have been obvious at the time the invention was made to provide the claimed integrated DBR and pump sources with the beam flattening optics characterized by hexagonal geometry as taught by Hough to Corcoran, Jiang and Waarts.

With respect to claims 50-51, the semitransparent mirror in Fig. 1 of Corcoran is considered as means for rejecting higher order beam modes.

11. Claims 52-53 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ken-ichi Ueda (applicant admitted prior art) in view of Feillens et al. (US 20040246570).

With respect to claim 52, Ueda discloses in Figs. 1-2 and 5 an efficient multi-core fiber laser comprising:

a plurality of high power laser pump sources (2D LD array in Fig. 5) that provide input electromagnetic energy;

a laser resonator cores (see Fig. 1) coupled to say plural pump sources and arrange directly receive said input electromagnetic energy and provide laser energy in response thereto,

a container (disk) accommodating said resonator cores, said container internally reflecting said input electromagnetic energy to facilitate coupling of said input electromagnetic energy with said laser resonator cores (see the entire reference).

However, Ueda does not teach said laser resonator cores comprising Er:YAG crystal.

Feillens discloses using Er:YAG crystal in laser fibers as mentioned throughout the Office action According to Feillens, erbium doped YAG fiber are advantageously used to provide a method of amplifying input optical signals over a broader bandwidth which extends to approximately 1650 nm in contrast to the approximately 1620 nm upper limit of previously known amplifiers. Therefore, it would have been obvious to use the Er:YAG in resonator cores as taught by Feillens to Ueda.

With respect to claim 53, the claims further recites the resonators cores being optical side coupled, edge coupled, fusion coupled, and/or prism coupled to said plural pump source. These coupling ways from pump sources to fibers are well known in the art.

With respect to claim 55, the claims further recite the container being a substantially flat disk or plate or spherical or cylindrical. Figs. 1-3 clearly show that the container has a disk shape.

12. Claim 64 is rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent … Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of view of Feillens et al. (US 20040246570).

Corcoran discloses in Fig. 1 a laser system comprising:

a plurality of laser fibers (single mode fibers) ;

a high power pump source #1, #2, …#5 coupled to each of said laser fibers; and

an external cavity (External cavity) having an optical axis, and beam-flattening optics (collimating lens) said external cavity having a first lens (left lens), a single aperture (spatial filter), a second lens (right lens), and a mirror (semitransparent mirror) located at focal points of the first and second lenses.

However, Corcoran does not the laser fibers including Er:YAG laser resonators.

Feillens discloses in Fig. 9 laser fibers including Er:YAG laser resonators 940 and 950 except for explicitly teaching the fibers being double cladding types. According to Feillens, erbium doped YAG fiber are advantageously used to provide a method of amplifying input optical signals over a broader bandwidth which extends to approximately 1650 nm in contrast to the approximately 1620 nm upper limit of previously known amplifiers.

It would have been obvious to one skill in the art at the time the invention was made to provide Er:YAG laser resonators as taught by Feillens.

13. Claim 65 is rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent … Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Feillens et al. (US

20040246570) and further in view Waarts et al. (US 6298187). Corcoran and Feillens disclose the claimed invention except for the laser fibers with differing lengths differ in length from one another by more than 1.5 centimeters. Waarts discloses fibers with different lengths by at least 1.5 cm to form different wavelengths (col. 11, lines 27-38). It would have been obvious to one skill in the art at the time the invention was made to provide fibers with different lengths by at least 1.5 cm as taught by Waarts to provide different wavelengths.

14. Claim 66-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent … Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Feillens et al. (US 20040246570) and further in view of Craig et al. (US 6356574).

With respect to claims 66-67, Corcoran and Feillens disclose the claimed invention except for the plural pump sources including a diode emitter array for each of said plurality of laser fibers. Craig discloses a plurality of fibers 18 including integrated DBR 18A/18B in order to provide optical feedback and wavelength stabilization (col. 16, lines 17-23) with each pump source 15 including at least one diode and a diode emitter array for each of said plurality of laser fibers in order to achieve high pump power output from amplifiers 18 (col. 7, lines 59-67).

With respect to claim 68, Craig discloses in Fig. 4 clad end pumping configuration including discrete imaging optics for imaging output beams from each diode emitter array to each laser fiber.

With respect to claim 69, Craig and Corcoran disclose the claimed invention except for explicitly teaching the diode emitter array is adapted to transmit at wavelength of approximately 1.5 microns. It would have been obvious to one having ordinary skill in the art at the time the

invention was made to provide claimed wavelength, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Corcoran, Feillens, and Kliner disclose the claimed invention except for the laser fibers with differing lengths differ in length from one another by more than 1.5 centimeters. Waarts discloses fibers with different lengths by at least 1.5 cm to form different wavelengths (col. 11, lines 27-38). It would have been obvious to one skill in the art at the time the invention was made to provide fibers with different lengths by at least 1.5 cm as taught by Waarts to provide different wavelengths.

15. Claims 70-73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran and Rediker (Operation of five individual diode lasers as a coherent … Applied Physics Letters USA, Vol 59, No. 7, 12 August 1991, hereinafter "Corcoran") in view of Craig et al. (US 6356574) and further in view of Hough (US 20040042085).

With respect to claim 70, Corcoran discloses in Fig. 1 a robust scalable laser system comprising:

a plurality of laser fibers (single mode fibers);

a high-power laser pump source (#1, #2, … #5) coupled to each of said fibers,

an external cavity having an optical axis, and beam flattening optics (collimating lenses), said external cavity having a first lens, a single aperture, a second lens and a mirror located along

the optical axis, said single aperture being of predetermined diameter and being located at focal points of the first and second lens. See Fig. 1.

However, Corcoran does not explicitly teach the fibers including integrated distributed Bragg reflectors, each pump source including at least one diode and a diode emitter array for each of said plurality of laser fibers and said beam flattening optics being characterized by hexagonal geometry.

Craig discloses in Fig. 1 a plurality of fibers 18 including integrated DBR 18A/18B in order to provide optical feedback and wavelength stabilization (col. 16, lines 17-23) with each pump source 15 including at least one diode and a diode emitter array for each of said plurality of laser fibers in order to achieve high pump power output from amplifiers 18 (col. 7, lines 59-67).

Hough on the other hand discloses hexagonal lenslets in order to reduce or avoid 10% loss of light intensity (paragraph 0029).

It would have been obvious at the time the invention was made to provide the claimed integrated DBR and pump sources with the beam flattening optics characterized by hexagonal geometry as taught by Craig and Hough to Corcoran.

With respect to claims 71-72, Craig discloses in Fig. 4 clad end pumping configuration including discrete imaging optics for imaging output beams from each diode emitter array to each laser fiber.

With respect to claim 73, Craig and Corcoran disclose the claimed invention except for explicitly teaching the diode emitter array is adapted to transmit at wavelength of approximately 1.5 microns. It would have been obvious to one having ordinary skill in the art at the time the

invention was made to provide claimed wavelength, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Communication Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phillip Nguyen whose telephone number is 571-272-1947. The examiner can normally be reached on 9:00 AM - 6:00 PM, Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MINSUN HARVEY, can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Phillip Nguyen/

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